AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for the quantification of the earth's subsurface area heat flow and its error bounds by stochastic analysis, said method comprising:

inputting values representing random thermal conductivity, an exponentially decreasing heat source and associated boundary conditions;

using~~devising~~ a stochastic heat conduction equation based on said input random thermal conductivity, ~~an~~exponentially decreasing heat source and associated boundary conditions ~~and~~ ~~arriving at~~to devise a stochastic solution to the temperature field obtained using a series expansion method, and

obtaining ~~the~~an expression for mean heat flow and variance in heat flow.

2. (Currently Amended) A method as ~~claimed~~in claim 1 wherein the boundary conditions are surface temperature and surface heat flow.

3. (Currently Amended) A method as ~~claimed~~in claim 1 wherein the stochastic heat conduction equation is of the formula

$$\frac{d}{dz}\left\langle K(z)\frac{dT}{dz}\right\rangle = -A(z).$$

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4.   (Currently Amended) A method as ~~claimed~~ in claim 1 wherein the stochastic heat conduction equation is solved using a series expansion method to obtain the closed form solution to the mean and variance in the heat flow fields, and using thermal conductivity of the subsurface layer of the earth's crust as a random parameter.

5.   (Currently Amended) A method as ~~claimed~~in claim 1 wherein the expression for heat flow is obtained and the expressions for the mean and variance in heat flow derived by taking expectation and using the property of the random field.

6.   (Currently Amended) Method for the evaluation of the thermal state for related oil and natural gas application, ~~and also~~ in tectonic studies and/<u>or</u> in studies related to the crystallization of minerals comprising quantifying the earth's subsurface area heat flow and its error bounds by stochastic analysis ~~comprising devising~~<u>said method comprising:</u>

<u>inputting values representing random thermal conductivity, an exponentially decreasing heat source and associated boundary conditions;</u>

<u>using</u> a stochastic heat conduction equation based on <u>said input</u> random thermal conductivity, ~~an~~exponentially decreasing heat source and associated boundary conditions ~~and arriving at~~<u>to devise</u> a stochastic solution to the temperature field obtained using a series expansion method, and

obtaining ~~the~~<u>an</u> expression for mean heat flow and variance in heat flow.

7.   (Currently Amended) A method as ~~claimed~~in claim 6 wherein the boundary conditions are surface temperature.

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8.   (Currently Amended) A method as ~~claimed~~ in claim 6 wherein the stochastic heat

condition equation is of the formula

$$\frac{d}{dz}\left\langle K(z)\frac{dT}{dz}\right\rangle = -A(z).$$

9.   (Currently Amended) A method as ~~claimed~~ in claim 6 wherein the stochastic heat

conduction equation is solved using a series expansion method to obtain the closed form solution

to the mean and variance in the heat flow fields, and using thermal conductivity of the subsurface

layer of the earth's crust as a random parameter.

10.   (Currently Amended) A method as ~~claimed~~ in claim 6 wherein the expression for

heat flow is obtained and the expressions for the mean and variance in heat flow derived by

taking expectation and using the property of the random field.

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